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(54) NANOTUBE SEMICONDUCTOR DEVICES

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(57) **ABSTRACT**

Semiconductor devices are formed using a thin epitaxial layer (nanotube) formed on sidewalls of dielectric-filled trenches. In one embodiment, a semiconductor device is formed in a second semiconductor layer disposed on a first semiconductor layer of opposite conductivity type and having trenches formed therein where the trenches extend from the top surface to the bottom surface of the second semiconductor layer. The semiconductor device includes a first epitaxial layer formed on sidewalls of the trenches where the first epitaxial layer is substantially charge balanced with adjacent semiconductor regions. The semiconductor device further includes a first dielectric layer formed in the trenches adjacent the first epitaxial layer and a gate electrode disposed in an upper portion of at least some of the trenches above the first dielectric layer and insulated from the sidewalls of the trenches by a gate dielectric layer.